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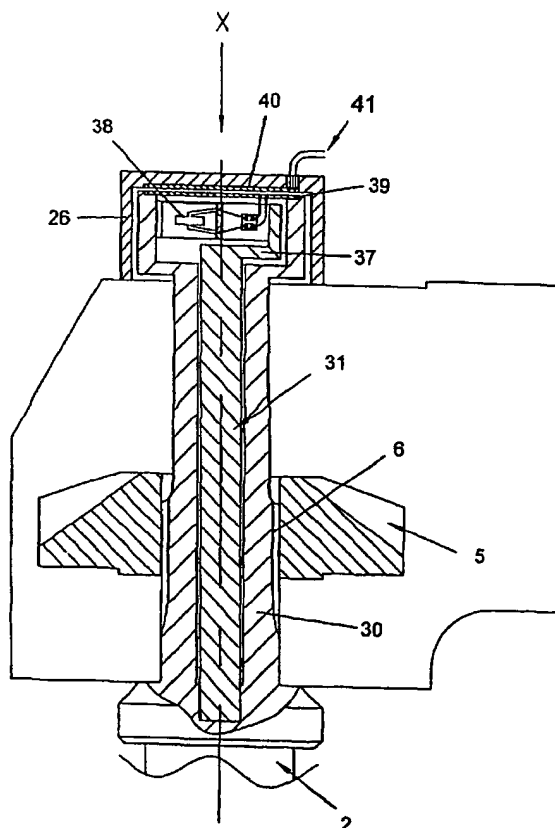
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[Continued on next page]

(54) Title: TORQUE SENSING TOOL



(57) Abstract: A torque applying tool such as a nutrunner or torque wrench incorporates torque sensors responsive to strain in a shaft (30) mounting an output square drive head (2) the strain being measured as it exists immediately adjacent the drive head (2). The shaft (30) is a hollow quill shaft an outer diameter of which is splined (6) to receive a torque drive input at a location axially spaced from the drive head (2). A central shaft (31) extends from the drive head (2) centrally up the quill shaft (30) and a flexible cantilever beam (34) is mounted between a cranked end (37) of the central shaft (31) as it extends out of the quill shaft (2) and the corresponding end of the quill shaft (2). One or more strain sensing transducers (38), preferably S.A.W. devices, are mounted on the cantilever beam (34) to detect flexure of the beam (34), and the resulting output signal is passed through an inductive or capacitive coupling (39,40) for transmission to a CPU (27) and display (28).

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/01330

A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B25B G01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 91 00989 A (BOSCH GMBH ROBERT) 24 January 1991 (1991-01-24) page 3, paragraph 2; figure 1 ---	1,7-9
A	US 4 757 721 A (CRANE DAVID O ET AL) 19 July 1988 (1988-07-19) the whole document ---	3
A	WO 01 67058 A (MAGORI VALENTIN ; SIEMENS AG (DE); WOLFF ULRICH (DE)) 13 September 2001 (2001-09-13) the whole document ---	5
A	WO 01 33180 A (LONSDALE BRYAN ; LONSDALE ANTHONY (GB); TRANSENSE TECHNOLOGIES PLC) 10 May 2001 (2001-05-10) the whole document ---	5
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 37 14 150 A (STABIL ELEKTRONIK GMBH) 17 November 1988 (1988-11-17) ----	
A	US 4 686 859 A (WALLACE PAUL) 18 August 1987 (1987-08-18) ----	
A	DE 25 55 982 A (KESSLER KARL H ING GRAD) 16 June 1977 (1977-06-16) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 03/01330

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9100989	A	24-01-1991	DE 3922860 A1 WO 9100989 A1 EP 0482014 A1 JP 4506863 T	17-01-1991 24-01-1991 29-04-1992 26-11-1992
US 4757721	A	19-07-1988	DE 3688065 D1 DE 3688065 T2 EP 0232606 A2 JP 62152683 A	22-04-1993 24-06-1993 19-08-1987 07-07-1987
WO 0167058	A	13-09-2001	DE 10054198 A1 WO 0167058 A1	13-09-2001 13-09-2001
WO 0133180	A	10-05-2001	GB 2358927 A AU 1154401 A BR 0007261 A CA 2356484 A1 CN 1340154 T EP 1144972 A1 WO 0133180 A1 JP 2003513266 T	08-08-2001 14-05-2001 29-01-2002 10-05-2001 13-03-2002 17-10-2001 10-05-2001 08-04-2003
DE 3714150	A	17-11-1988	DE 3714150 A1	17-11-1988
US 4686859	A	18-08-1987	US 4676109 A DE 182185 T1 EP 0182185 A2 JP 61181932 A	30-06-1987 25-09-1986 28-05-1986 14-08-1986
DE 2555982	A	16-06-1977	DE 2555982 A1	16-06-1977